Tweetocracy Switzerland: exploring the representativeness, structuration and content of swiss party politics on twitter

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very first draft – suggestions are highly welcome

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Abstract

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1 Introduction

This contribution sets out to explore the presence and activity of Swiss parties on Twitter. Twitter is a microblogging service with a growing user community since 2006. With some delay, this social media site also has established a considerable user base in Switzerland. According to a comprehensive report by the World Internet Project Switzerland from December 2013 (Latzer et al., 2013), half of Swiss adults (49.5 percent) use one or another Social networking site. Although only 18 percent thereof are Twitter users, the popularity of this particular microblogging platform has surged from only 11 percent in 2011. Thus, despite the fact that that many Twitter users have very low activity ratings – i.e. the pace with which they (re-)tweet, follow other users or favor tweet –, the explosive growth of its usage motivates a closer look at how this particular social media plays out in terms of Swiss party politics. Moreover, as Wallsten (2010) shows for election campaigns in the USA, bloggers and political campaigners occupy an influential position in shaping the political agenda. It does thus not come with a surprise that about one third of all members of the Federal Assembly and one Federal Councilor have a Twitter account. From time to time, the Tweets they publish also reach the broader public, as it was the case with Jacqueline Badran, a representative of the Social Democratic Party in the National Council in March 2013. After insulting a doorman on Twitter for expulsing her from a club where she illicitly lighted a cigarette, an outcry in the mainstream media even led to sporadic demands for her resignation.

The goal of this study is threefold. The most basic goal of the analysis provides systematic data on the presence and activity of Swiss parties on Twitter. There is much talk about the merits and perils of social media for politics and society. However, despite the mostly public nature of Twitter accounts and the scalability of data scraping on Twitter, it is surprisingly hard to collect data for specific purposes – such as the communication of Swiss parties as in this case – in a systematic and reliable way. In this study, the sampling is achieved by extending a core set of central Twitter accounts via the friendship and following relationships. It can be shown that this strategy, which yields 957 Twitter accounts, reaches the boundaries of the Swiss political party network.

Further, the representativeness of the political communication by Swiss parties on Twitter will be revealed. Any useful contextualization of the Swiss parties' communication on Twitter needs to be aware of fundamental characteristics such as the network hierarchy or the representativeness of the political communication on Twitter compared to 'offline' politics. Thus, parts of this contribution will be concerned with the size and density of network cliques (such as the single parties or language communities), which then are compared to data on conventional politics and the socio-structure of Switzerland. Most of all, this will answer question whether we find the same imbalances in terms of influence and political representation in the partisan Twitter sphere than in the Swiss party system more in general.

Besides these substantive findings, the study contributes to the debate how Twitter data can be used in political science studies. To this aim, the findings on

the representativeness and structuration are used to post-stratify simple measurements of political communication such as the number of followers, messages send and the usage of specific issues. This way, this contribution also can provide recommendations for future researchers to refine their research designs to study Twitter.

2 Twitter, Politics and the Swiss case

As "the Internet dramatically changed the communication landscape with the introduction of myriad new channels" (McCombs, 2005), many social scientists started out to explore how these new channels of political communication relate to traditional politics (Wallsten, 2010; Barberá, 2013). As for micro blogging like Twitter, a heightened debate has broken out about the merits and perils of engaging in analyses using such data in the aftermath of the 2008 presidential election in the USA, where it first was used as a campaigning tool on a massive scale.

A first strand of literature gives reason to believe in the validity of Twitter analyses. Applying descriptive statistics, Tumasjan et al. (2010) found that the simple number of messages mentioning German political parties mirrored the result of the 2009 German general election surprisingly well. They maintain that the results even challenge the accuracy of traditional election polls. Similarly optimistic evaluations can be found in studies applying different methodological approaches to predict election results in the United Kingdom Lampos (2012), the Netherlands Sang and Bos (2012), Singapore Skoric et al. (2012), and the United States (Barberá, 2013). Further, O'Connor et al. (2010) showed that a simple sentiment analysis of Tweets reflects Obama job approvals during the first two year of his presidency quite accurately. Subsequently, Curini, Iacus and Porro (2014) also showed that the measurement of public opinion via Twitter is feasible also in the context of Western European politics. The proponents of using Twitter as a data source stress the widespread usage of this microblogging service as well as the amount and richness of data available. "One distinct characteristic of this online social network is the presence of not only ordinary citizens, but also public officials, political parties, and candidates" (Barberá, 2013), which can potentially be used to infer population attitudes and the nature of political campaigns. This potential seems very promising, since Twitter allows unrestricted downloads to millions of public accounts and their messages in real-time. Furthermore, the scope for the application of methods deriving public opinion and political campaigning from Twitter data is large, since the microblogging platform has grown into a substantial player in the media market of most countries around the world.

In reaction to these optimistic studies, a second strand of literate advices caution against too euphoric assessments of Twitter's potential for answering social scientific research questions. Gayo-Avello (2012), to begin with, highlights his concerns with disappointing evidence from several US Senate races, which shows that electoral predictions from Twitter data using similar methods

as the studies just mentioned are failing to perform better than chance (see also Barberá, 2013). Other critics maintain that at least some studies optimized the research designs in their favor. For example, if Tumasjan et al. (2010) had not restricted the sample of parties to the ones with national parliamentary representation, they would have predicted the Pirate Party to win the 2009 German general election, since it was the party with the highest number of mentions in Twitter (Jungherr, Jurgens and Schoen, 2012). Besides methodological shortcomings, these critiques prominently name two sources of selection bias that inflate the results. First, personal traits are likely to hamper the representativeness of Twitter data: "The average internet user is younger, more interested in politics, and comes from a higher socioeconomic background than the average citizen, which raises concerns about external validity" (Barberá, 2013). In addition, not only socio-structural differences between Twitter users and the basic population should be expected, but also ideological ones (Krueger, 2006). In line with its roots in the social movements of the 20th centuries, the political left in Western Europe and the United States has a preference for participatory forms of decision making (Kriesi et al., 2012). Thus, parties from the political left can be expected to have integrated interactive forms of Internet usage like microblogging much easier into its action repertoire. Second, the interdependence among the units of analysis (be it the Twitter accounts or the messages sent), which is sometimes exploited to generate data, is a further source of bias. Social media networks are assumed to be highly homophilic, i.e. the relationships among users are systematically clustered along ideological and/or socio-structural lines (Lawrence, Sides and Farrell, 2010; McPherson, Smith-Lovin and Cook, 2001). The underlying mechanism relates to selective exposure. Users have a higher propensity to follow other users who share their own beliefs. At the same time, they expose themselves less likely to opposing views (Sunstein, 2001). In the end, this may leads to a non-representative distribution of the observed variables.

Scholars who maintain that Twitter is a valid data source do not neglect these potential sources of selection bias. So far, they tried to enhance prediction by externally validating their results with traditional political science data, by applying sophisticated machine learning algorithms (Pennacchiotti and Popescu, 2011) or by estimating individual traits which potentially case selection bias such as gender and ethnicity from within the Twitter data (Barberá, 2013). This contribution, in contrast, suggests an actor based approach to systematically trace political communication in the abundance of communicative acts. More precisely, it is maintained that a deliberate selection of Twitter accounts according to their self-declared affiliation to a Swiss party helps to establish a network, which by definition represents party politics on Twitter. Thus, selection bias can be measured and amended by post-stratification in a reliable and transparent way. This approach is similar to the one suggested by Jungherr, Jurgens and Schoen (2012), who claim the only way to achieve an accurate prediction from Twitter data is to correctly identify likely voters and compiling an un-biased sample of users from this sample.

For several reasons, Switzerland is a valuable case to explore the feasibility

of Twitter for studies on political communication and public opinion. First, due to the distinctive consensus-oriented character of its political system (most of all its highly federal and direct democratic institutional system, (see Lijphart, 1999), Switzerland has very low access barriers to the public debate (Höglinger, 2008). Compared to most other countries, a larger variety of actors is able to engage in political communication. If there is a systematic relationship between Twitter and traditional politics, Switzerland thus seem to be a most likely case to study its nature more in detail. At the same time, the size of the Twitter sphere in Switzerland is comparatively straightforward. Thus, it is much easier to get a comprehensive and comparable sample of Twitter accounts than in larger countries. Finally, as in most other countries, social media are an upcoming phenomenon in the media landscape in Switzerland, which requires a closer look also from a political science perspective. According to a comprehensive report by the World Internet Project Switzerland from December 2013 (Latzer et al., 2013), half of Swiss adults (49.5 percent) use one or another Social networking site. Although only 18 percent thereof are Twitter users, the popularity of this particular microblogging platform has surged from only 11 percent in 2011. Thus, a contextualization of political communication on Twitter has also practical merits for political observers and policy makers in Switzerland.

3 Retrieving data from and coding Twitter accounts

The first steps in the data gathering process is the identification of the network boundaries of Swiss party politics on Twitter. While the conception seems straightforward – theoretically, we simply would need to include the Twitter accounts of every Swiss party member into the analysis –, the empirical realization is not. Indeed, the myriad of accounts and their highly unstructured descriptions make the definition of the network boundaries one of the most difficult challenges of this contribution.

A first decision of which Twitter accounts match the definition of 'Swiss party politics' was to start with a position-based approach (see Marin and Wellman 2011). More precisely, an initial core set of Twitter accounts was compiled by hand according to the importance of these accounts for the political system in Switzerland. This list contains members of both chambers of the national parliament (National Council and Council of States), Federal councilors as well as the official national accounts of the eight most important parties in Switzerland.[1] Two accounts which were not public needed to be dropped from the

[1] Bürgerlich-Demokratische Partei (Conservative Democratic Party, BDP), Christlich-Demokratische Volkspartei (Christian Democratic Party, CVP), Evangelisiche Volkspartei (Evangelical People's Party, EVP), Freisinning-Demokratische Partei (The Liberals, FDP), dei Grünen (Greens, GPS), Grünliberale Partei (Green-Liberal Party, GLP), Schweizerische Volkpartei (Swiss People's Party, SVP) and Sozialdemokratische Partei (Social Democratic Party, SP). During the data gathering process, several fringe parties from the left or right pole of the ideological spectrum were identified. These parties were recoded into the cate-

analysis, since by default no data can be collected from them. The final core list consists of 89 Twitter accounts (see Table 9 in the Appendix: 1 Federal Councilor, 12 Councilors of State, 8 party accounts and 68 national councilors. This list is far from representative with regard to the political landscape, for example only one out of seven Federal Councilors, Alain Berset, has a public Twitter account. However, exactly this self selection, i.e. which politicians are participating in the political Twitter sphere and how this self selection might affect the representativeness of political communication on Twitter, is one of the main interests of this contribution.

The definition of the core list according to the position of accounts in the political system of Switzerland ensures that the following semi-automatic extension of the Swiss party politics network starts from the most central accounts. This means that from this core set, a chain-referral extension based on the relations of the core users was pursued. More precisely, in two extension rounds using the options to tap Twitter data via the Stream API on a large scale,[2] the friends and followers of the Twitter accounts already defined as relevant were collected and then coded according to their relevance. Table 1 shows an overview of the two extension rounds performed.

Table 1: Establishing the Swiss political party network: key figures of extension rounds

	N accounts		
List	total	unique	relevant
Core set	89	89	89
First extension	255'721	61'308	819
Second extension	660'000	150'808	50

A friend and follower of an account already identified as relevant needs to fulfill two requirements to be included in the list of relevant accounts. First, the account is relevant if it is located in Switzerland. As a matter of fact, a large part of users actually indicated their location in the predefined entry field. With the help of the geocoding services by *Google Maps*, *Bing Maps* and *MapQuest*, which all allow for keyword searches, the locations were systematize. This means that all instances of the same location were attributed to one single pair of geographic coordinates. For example, Zurich was indicated as 'Zürich', 'Zuerich', 'Zurich', 'ZRH' and had to be standardized to 'Zurich' before the geocodes could be retrieved.[3]

Secondly, a simple keyword match with the items indicated in Table **??** in

gories Radical Right (RR) and Radical Left (RL), respectively.

[2]In R, the packages ROAutch and TwitteR provide the necessary functions to automatically collect Twitter data.

[3]The efficacy of this process could be considerably enhanced by using Regular Expression Syntax and string matching via the restricted Damerau-Levenshtein distance. In addition, all non-alphanumeric characters were removed before the matching.

the appendix was applied to the descriptions and names of the Swiss Twitter accounts. The keyword gazetteer contains all names, abbreviations and paraphrases of the parties as well as all official employment titles of Swiss politicians in the three official languages of Switzerland (Italian, French, and German). In addition, a general search for indications of political matters was performed in order to avoid false negatives. Since this matching filtered the number of accounts already to a considerable degree, no further automatization steps such as machine learning classifications were necessary. Consequentially, all keyword hits were manually checked for their relevance. This final step led to the inclusion of 819 additional accounts into the sample.

Both requirements rely on the self declaration of the users, which of course raises the problem that the users are not representative to a larger population, which, for example, could be defined as all Swiss citizens with a right to vote. However, it is not the aim of this contribution to make inferences to some basic population. Rather, a sample reflecting as many users affiliated to Swiss parties as possible is envisaged. In the end of the day, it is also crucial from a theoretical point of view whether Twitter users indicate location and party affiliation. If not, they might not using the account for political campaigning but rather for private or business purposes.

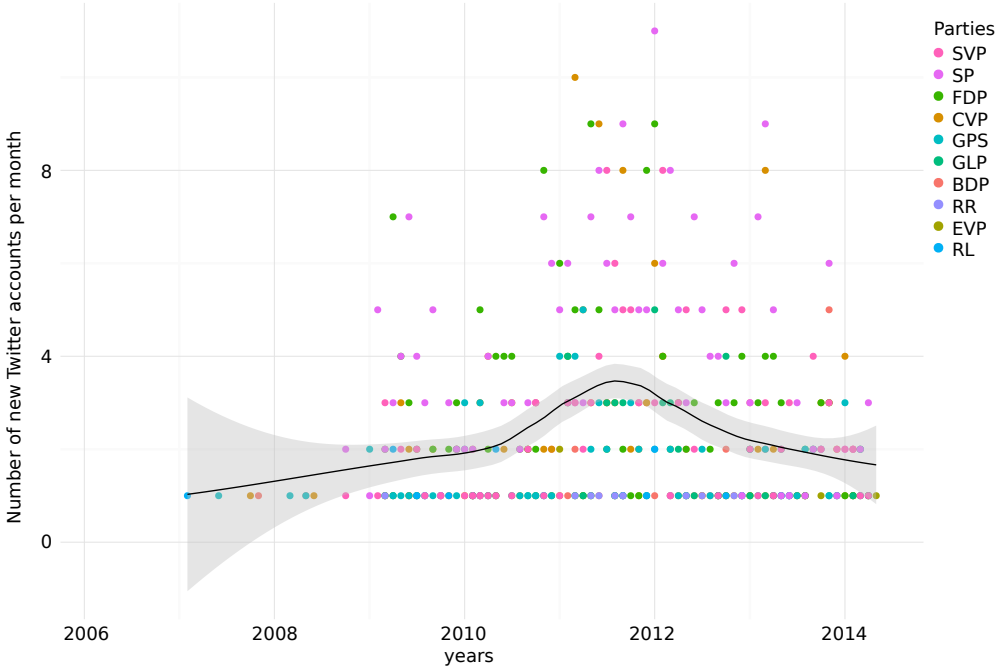
As a word of caution, it is of course the case that by far not all Twitter users indicate the location and description of their accounts. Thus, relying on the self declaration of Twitter users yields missing data. However, it is the only method to systematically extend the network without relaxing the identifying definitions for the network extension. There is no other information provided for the Twitter accounts besides the self declarations in the location, name and description entry fields; and relying on searches in external data such as the official parliamentary services or wikipedia simply is not feasibly for such a large number of accounts. While the sample of Twitter users includes the most important party accounts in the core list which was manually compiled, it also represents a systematic extension thereof. Nevertheless, it is not clear whether the second extension round came close to the network boundaries. However, since the total amount of Twitter users is estimated to amount to about 500'000,[4], already about 10 percent of all Swiss accounts were included into the snowball sampling. In addition, the dramatically decreasing number of additional relevant accounts from the first to the second round of extension points to the fact that not much new partisan accounts would be found in further extensions.

As Figure 1 shows, the first Twitter account by a Swiss partisan actor – namely by Stefano Araujo from the Partito Comunista Ticinese (the Ticino offshoot of the Swiss Party of Labour, a small radical left party) – was created in February 2007, eleven months after the introduction of the microblogging service. Further, the smoothed trend line shows a clear pattern. the growth of the Swiss party network on Twitter is moderate until Spring 2010. There-

[4]The most recent estimation available is 420'000 users in 2012, but this number is likely to have increased dramatically over the last two years.

after, the pace substantially accelerates until the end of 2011. Hence, before 2010, Twitter seems to be a communication tool only at the fringes of political campaigns. As a matter of fact, however, the peak in late 2011 seems to be clearly related to the federal election in November 2011. Many politicians thus appear to have set up an account as an attempt to mobilize additional support during the election campaign. In sum, the introduction of social media as an important campaign tool in Switzerland slightly lagged compared to the United States, where commentators see the win of Barack Obama in 2008 as being the first 'social media election' (Wallsten, 2010).

Figure 1: Diachronic development of Twitter account setups by parties: absolute numbers of setups and loess smoothed trend line



Using this sample of 957 relevant Twitter accounts, the network data (friendship and following relationships) as well as the tweets were downloaded using the Twitter API. To analyze these data sets, descriptive statistics, exponential random graph models, sentiment analyses and unsupervised text classification methods are applied. All the data collection, actor coding, network analysis, text classification and all visualization were conducted using several libraries from the statistical framework *R*.[5]

[5]Most of all *TwitteR*, *igraph*, *ergm*, *RTextTools* and *ggplot2*.

4 Exploring the Swiss Tweetocracy

4.1 Representativeness

The presentation of the results starts with a descriptive overview of both the geographical and diachronic distribution of the 957 party accounts in the sample. Figure 2 shows the overall geographical distribution of the number of Swiss parties' Twitter accounts, while dot sizes represent the cumulative number of Twitter accounts. More precisely, some accounts did not only indicate 'Switzerland' as their location and not a specific city. Thus, these actors could be plotted onto the map of Switzerland using their geolocation. In Figure 2a, which indicates the overall distribution, it becomes evident that the urban centers by far are most important in the Twitter sphere. The largest Swiss cities are the locations where most accounts are created. However, the distribution of Twitter accounts does not uniformly follow population size, since especially Basel, Lausanne and Winterthur are home to less account than could be expected. This is confirmed by the more detailed analysis presented in Table 2. The geoloations of the Twitter accounts[6] are recoded according to the size of the population in the corresponding communities. This way, the distribution of Twitter accounts can be compared to demographic data in order to assess the representativeness the Twitter sphere. As already mentioned, the urban centers[7] are substantially overrepresented in the sample. However, the accounts from small communities achieve quite a high share of all Twitter users as well, which makes the middle sized communities[8] the most underrepresented in the sample. In sum, while the urban centers are strongly represented and also the rural areas fare rather well, it is the 27.5 percent of the population from regional centers or suburban areas which have almost no voice on Twitter. Location therefore is major factor biasing communication on Twitter as the exceptionally high Least Squares index[9]

[6] Again, the few accounts mentioning only Switzerland in general as their location had to be excluded.

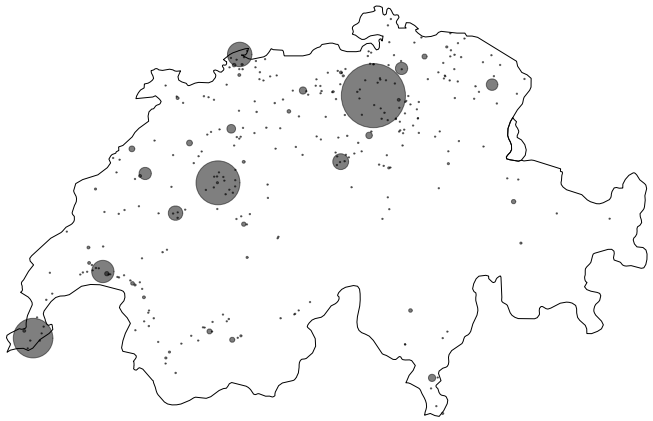
[7] There are 19 communities in Switzerland with more than 30'000 inhabitants: Basel, Berne, Biel/Bienne, Chur, Fribourg, Geneva, Köniz, La Chaux-De-Fonds, Lausanne, Lucerne, Lugano, Neuchatel, Schaffhausen, Sion, St. Gallen, Thun, Urdorf, Winterthur and Zurich.

[8] There are sixteen cities with a population between 20'000 and 30'000 inhabitants: Aarau, Bulle, Emmen, Frauenfeld, Kreuzlingen, Kriens, Lancy, Meyrin, Montreux, Rapperswil-Jona, Renens, Riehen, Wädenswil, Wettingen, Wetzikon and Zug.

[9] Calculated as the the square root of half the sum of the squares of the difference between the quantity to be compared with and the quantity to compare, see notes in Table 2.

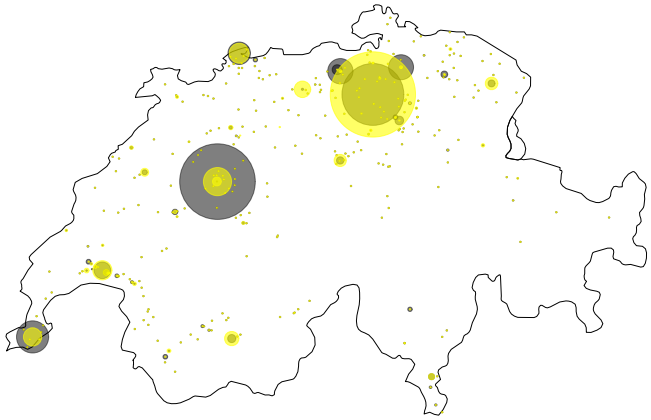
Figure 2: Geographical distribution of Twitter accounts

(a) Overall distribution of Twitter accounts



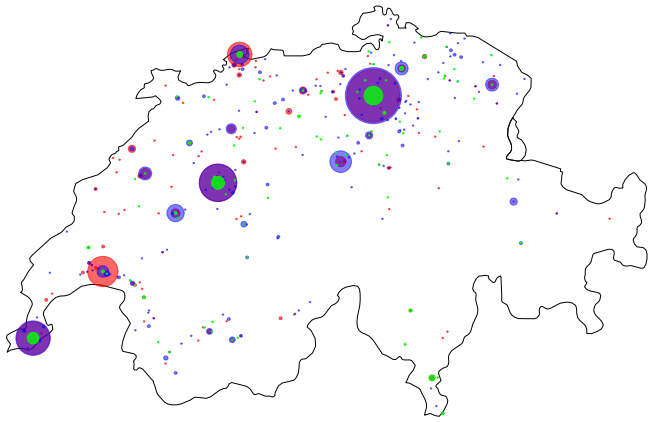
Notes: Dot sizes represent the cumulative number of Twitter accounts for all Swiss parties on a scale of 1:10.

(b) Distribution of Twitter followers and activity



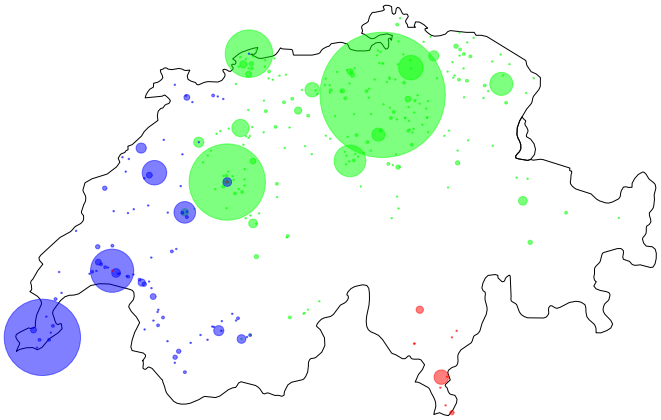
Notes: Dot sizes represent the cumulative number of followers (black) as well as the activity (yellow) for all Swiss parties on a scale of 1:5000 (followers) and 1:15'000 (activity).

(c) Distribution of Twitter accounts by party families



Notes: Dot sizes represent the cumulative number of Twitter accounts by Swiss parties on a scale of 1:5. Parties were aggregated as follows: left parties (red) = SP, RL and GPS; center-right parties (blue) = GLP, FDP, CVP, EVP and BDP; right-wing parties (blue) = SVP and RR.

(d) Distribution of Twitter accounts by language



Notes: Dot sizes represent the cumulative number of Twitter accounts by language (Italian = red, French = blue, German = green) on a scale of 1:5.

Table 2: The representativeness of the Swiss Tweetocracy in terms of locations: Column percentages and absolute numbers in brackets

Community size	Population[a]	Twitter
>= 30'000	21.4	49.2 (426)
>= 20'000	27.5	5.4 (47)
< 20'000	51.1	45.4 (393)
Total	100	100 (866)
LSI[b]		20.1

Notes: [a] All permanent residents in Switzerland in percentages, Source: Federal Statistical Office.; [b]LSI = Least squares index: $\sqrt{\frac{1}{2}\sum(v_i - s_i)^2}$, where v is the quantity to be compared with (usually vote shares) and s the quantity whose representativeness should be measured (usually parliamentary mandates).

In Figure 2b, the relationship between the activity of the Twitter users in the sample and their followership is depicted. Activity is a cumulative index derived from the number of messages, friendships and favoring of messages. This index provides a good idea on how strongly users are engaged in the communication via Twitter. The number of followers, by contrast, can be seen as an indicator for the reputation of Twitter users, i.e. how many other users are interested to follow and thus to receive the messages. While the two indicators cannot directly be compared because of the different scales, there relative quantities provide information on how much the Twitter users gain compared to their investment in terms of communicative acts. Especially intriguing is the comparison of the capital Berne and Zurich, the largest city and economic powerhouse of Switzerland. While the accounts from Zurich on average are particularly active, the accounts from Berne are the ones clearly more people want to follow. In a similar vein, Twitter users in Aarau, Winthertur, and Geneva seem to be able to generate many followers with a comparatively low activity.

The next graph in Figure 2b shows the locations of accounts for the three major blocks of the Swiss party system: the left parties (SP, RL and GPS), center-right parties (GLP, FDP, CVP, EVP and BDP) and the right-wing parties (SVP and RR). This overview shows clear evidence in favor of the expectation of a left bias on Twitter. The left has equal or even more accounts in the larger cities than the center parties. Only some regional centers such as Fribourg, Lucerne and Chur are dominated by center parties on Twitter as well. While in the last federal elections, the left parties achieved a vote share of 27.9 percent, they managed to accumulate 38.2 percent of all accounts (see Table 3). Even more impressive is the achievement in terms of followers. The left has almost garnered a majority of the follower shares (47.2 percent). The political movement which clearly is underrepresented on Twitter are the right-wing parties. However, depending on the indicator, the Twitter presence of the largest party in Switzerland, the Swiss People's Party is 7.6 to 13.6 percent lower than its electoral support. This corresponds to their constituency, which on average is elder and probably uses social media less intense. The one exception is the

Lega dei Ticinese, which has a quite strong presence on Twitter in Ticino (the most southern canton of Switzerland).

Table 3: The representativeness of the Swiss Tweetocracy in terms of partisanship: Column percentages and absolute numbers in brackets

	Federal election 2011		Twitter		
party	vote share	mandates	followers	accounts	activity
SVP	26.6	27.1	14.1	13.0	19.0
SP	18.7	23.1	32.4	27.4	26.1
FDP	15.1	15.1	17.0	18.4	12.9
CVP	12.3	14.1	11.0	14.8	10.4
GPS	8.4	7.5	13.5	8.9	12.9
GLP	5.4	6.0	4.5	6.9	4.7
BDP	5.4	4.5	2.9	5.0	5.5
RR	2.7	1.5	1.9	1.5	1.3
EVP	2.0	1.0	1.3	2.5	4.2
RL	0.8	0	1.3	1.9	3.3
Others	2.6	0	–	–	–
Total	100	100	100	100	100
LSI[a]	–	3.73	11.9	13.9	8.8

Notes: [a]LSI = Least squares index: $\sqrt{\frac{1}{2}\sum(v_i - s_i)^2}$, where v is the quantity to be compared with (usually vote shares) and s the quantity whose representativeness should be measured (usually parliamentary mandates). See Table 11 in the Appendix for the absolute numbers of followers, accounty and activities.

The distribution of the Twitter accounts by language (see Figure 2d), finally, holds no surprise. The accounts were consistently created in the respective language region. The only slightly multilingual city is Berne, which of course is due to the fact that the capital is home to representatives from all regions as well as the seat of the General Secretariats by national parties communicating in all three official languages. A closer look at the representativeness in Table 4 also shows that the misfit between the socio-demographic and Twitter data is not as large as for community size. Italian speaking Swiss citizens as well as residents indicating English as their main language are less well represented in Swiss party politics on Twitter. The French speaking minority, by contrast, has a higher share of Twitter accounts as its size in the population. These two differences balance each other so that the German speaking parts of the population experience an almost identical descriptive representation on Twitter.

Table 4: The representativeness of the Swiss Tweetocracy in terms of languages: Column percentages and absolute numbers in brackets

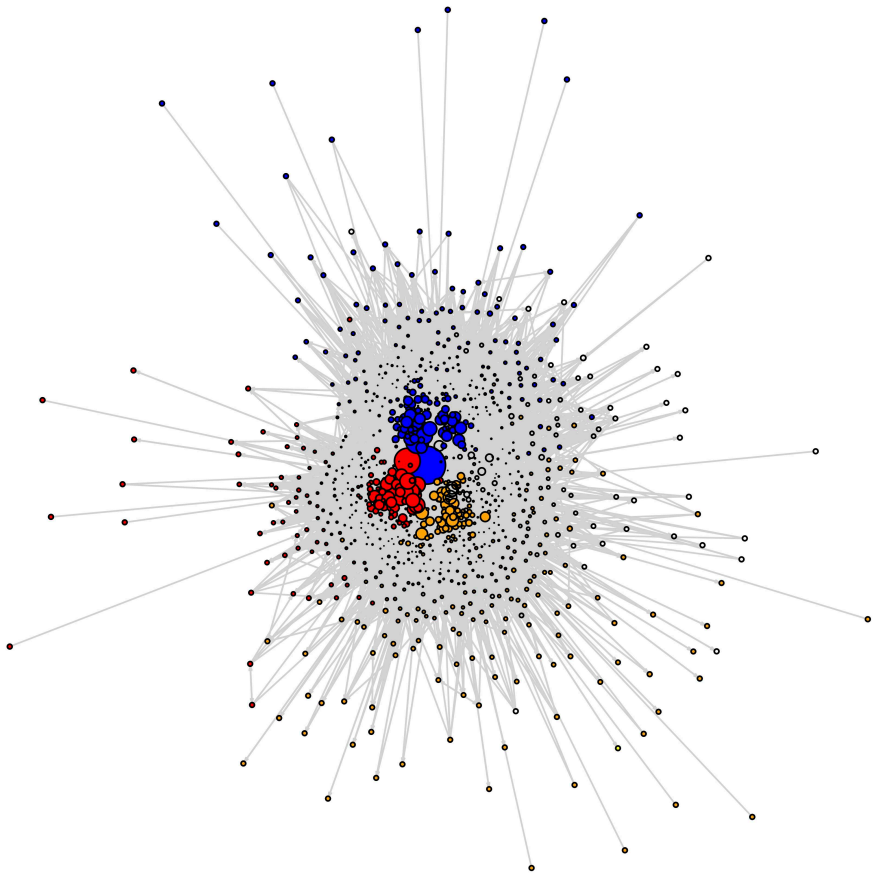
Language	Population[a]	Twitter
German	64.9	64.5 (617)
French	22.6	31.2 (299)
Italian	8.3	3.1 (30)
English	4.6	1.1 (11)
Total	100	100
LSI[b]		7.5

Notes: [a] Share of declarations of main language by all permanent residents in Switzerland over the age of 15 in percentages. Source: Federal Statistical Office; [b]LSI = Least squares index: $\sqrt{\frac{1}{2}\sum(v_i - s_i)^2}$, where v is the quantity to be compared with (usually vote shares) and s the quantity whose representativeness should be measured (usually parliamentary mandates).

4.2 Structuration

The last section has provided results on how the sample of Swiss political Twitter accounts compares to the socio-political context. In this section, the focus turns to the study of the internal structure of the network which these Twitter accounts build. There is a multitude of possible relationships among Twitter users. For example, Twitter users can speak to each other (using the prefix '@'), retweet the messages of others or favor them. Such relationships rather refer to the content of political communication and will be dealt with in the next section. Since this section cares about the structure of the political Twitter sphere in Switzerland, the following analyses rely on two other straightforward relationships: every Twitter account can be followed (i.e. the user has followers in the Twitter Terminology) or follow itself other accounts (i.e. the user has friends). More precisely, this network definition yields a directed graph in which two vertices (i.e. Twitter users) can be connected by a friendship, a following or both of these relationships. In the latter case, the relationship is mutual and therefore its weight in the data is doubled. Figure 3 provides first information on the resulting network. The graph results from several estimations. First, a standard fruchterman reingold layout is applied to place the vertices in the two dimensional space such that there are as few crossing edges as possible. Second, the residuals from the correlation between the eigenvector and betweenness centrality are used to illustrate the importance of the accounts (the larger the dots the more central is an account). This analysis is documented in Figure 5 in the Appendix, where also the names of the most important users can be found. Third, the coloring of the vertices is the results of an inductive spinglass community analysis which yielded four cliques that could be assigned to specific parties or language groups.

Figure 3: Twitter network of friendships and followings: fruchterman reingold layout[a] and cliques based on directed relationships between accounts[b]



Notes: [a] Vertex sizes correspond to the residuals from the correlation between eigenvector and betweenness centrality; [b] Colors indicate the following 4 spinglass communities which can be interpreted by either party or language affiliations: yellow = BDP and CVP; orange = GLP, FDP, SVP; blue = French speaking accounts; red = GPS and SP.

To begin with the overall structure, it is striking that there are comparatively few accounts which are placed in the middle of the graph and thus have a high centrality. The majority of Twitter users with a Swiss party affiliation only follows or is friend with very few accounts. The network density for the full network (listed in Table 5 confirms this finding: Only 6 percent of all possible relationships actually are present. Nevertheless, close to the center of the graph, there are some highly integrated actors, most notably Alain Berset (the social democratic Federal Councilor, the biggest blue dot) and Christian Levrat (the party president of the SP, biggest red dot). Alain Berset's account is particularly interesting. He is in the only clique in which all parties are included. The actors

of this blue clique share the French language as common characteristic. The fact that – besides his language background – he is a member of the Social democrats, is reflected in the closeness of Alain Berset to the red subgroup. In addition to Alain Berset, the Figure 5 in the Appendix shows Jean Christophe Schwaab, a National Councilor of the SP from the canton of Vaud, as a further crucial figure. Toni Brunner, president of the SVP, Christian Wasserfallen, a National Councilor of the FDP from the canton of Berne, and Nathalie Rickli, a National Councilor of the SVP from the canton of Zurich, are central to the clique which mainly comprises accounts by the center right (GLP, FDP and SVP). And for the red clique, Cédric Wermuth, National Councilor for the SP from the canton of Aargau, accompanies Christian Levrat.

Table 5: The structuration of the Swiss Tweetocracy in terms of relationships: Subgraph densities[a] by parties, languages and community sizes

Full network	0.06	*Parties*	
Languages		SVP	0.17
German	0.07	SP	0.15
French	0.13	FDP	0.12
English	0.47	CVP	0.16
Italian	0.43	GPS	0.34
Communities		GLP	0.24
$>$ 30'000	0.07	BDP	0.44
$>$ 20'000	0.05	RR	0.28
$<$ 20'000	0.06	EVP	0.32
National	0.09	RL	0.08

Notes: [a] Number of edges over maximal possible number of edges.

It is striking that we find politicians which could be labeled as shooting starts alongside the generally highly influential persons (one Federal councilor and two party presidents) among the most central actors. Cédric Wermuth, Natalie Rickli, Jean Christophe Schwaab and Christian Wasserfallen all are significantly younger than the average national politician and can already look back at a very successful political career. Thus, this hints to another expected bias, namely that Twitter communication is skewed towards the younger population. It seems plausible that many young politicians rely more heavily on social media communication since they should anticipate the audience to be younger and thus more receptive to their campaigning.

The descriptive analyses presented so far do not tell us something about how important the single factors are compared to each other. To better evaluate the significance of the different factors, the exponential random graph model presented in Table 6 shows the covariant effects of the actor-specific variables as discussed so far on the likelihood of two actors to build a relationship. Since most of the variables are categorical, the effects can only be interpreted in terms of a reference category, which always is chosen as the most frequent category

one (SP for the parties, German for the languages, and > 30'000 inhabitants for community size). In addition, the model controls for the overall connectivity in the network (*edges*), the number of followers and the activity on Twitter (*friends and tweets*). Table 6 in the Appendix presents an assessment of the goddess of fit by showing that the log-odds for a relationship as predicted by the model lies well within the range of predictions derived from 100 simulations.

Table 6: Covariates of the structuration of the Swiss party politics network: log-odds ratios, standard errors and levels of significance of an exponential random graph model on the likelihood of nodes to have a relationship

Node factors	Estimate	Std.Error	p-value
Party (ref=SP)			
SVP	-0.281	0.011	***
FDP	-0.334	0.010	***
CVP	-0.366	0.011	***
GPS	0.113	0.011	***
GLP	-0.491	0.015	***
BDP	-0.203	0.015	***
EVP	-0.779	0.027	***
RR	-1.079	0.042	***
RL	-1.106	0.036	***
Language (ref=German)			
French	-0.059	0.007	***
Italian	-0.411	0.025	***
English	1.079	0.019	***
Community size (ref = > 30'000)			
< 20'000	-0.162	0.007	***
>= 20'000	-0.240	0.016	***
Switzerland in general	0.252	0.011	***
tweets	-1.771	0.159	***
followers	-0.676	0.125	***
friends	-1.084	0.143	***
edges	-2.271	0.013	***
AIC	385342		
N egdes	51'541		
N vertices	957		

Notes: Significance codes: ***=0.001; **=0.01; *=0.05. Edge weights applied.

As far as the coherence among parties is concerned, only membership in the Green party seems more important to explain a relationship than membership in the Social Democratic party (probability of 0.53). The party which is most often connected with a professionalized and tightly organized hierarchy, the SVP, considerably lags behind the two left parties (probability of 0.43). The two newcomers in the Swiss party system, the BDP and GLP, which are somewhat overrepresented on Twitter compared to their electoral strength, fare completely different. While the members of the BDP seem to build an only

slightly inconsistent group (probability of 0.45), the members of the GLP are relatively more scattered across the network (probability of 0.37).

The difference between the two major languages, French and German, is only marginal. Italian speaking persons, by contrast, are substantially less likely to be connected (0.40). For the few English accounts, the opposite is the case. The probability that they build a relationship among each other is 0.75. Community size is more important to explain the relationships. Twitter users living in sub-urban areas (communities with less than 30'000 inhabitants, probability of 0.46) and in rural areas (communities with less than 20'000 inhabitants, probability of 0.44) are less likely to be connected than urban dwellers.

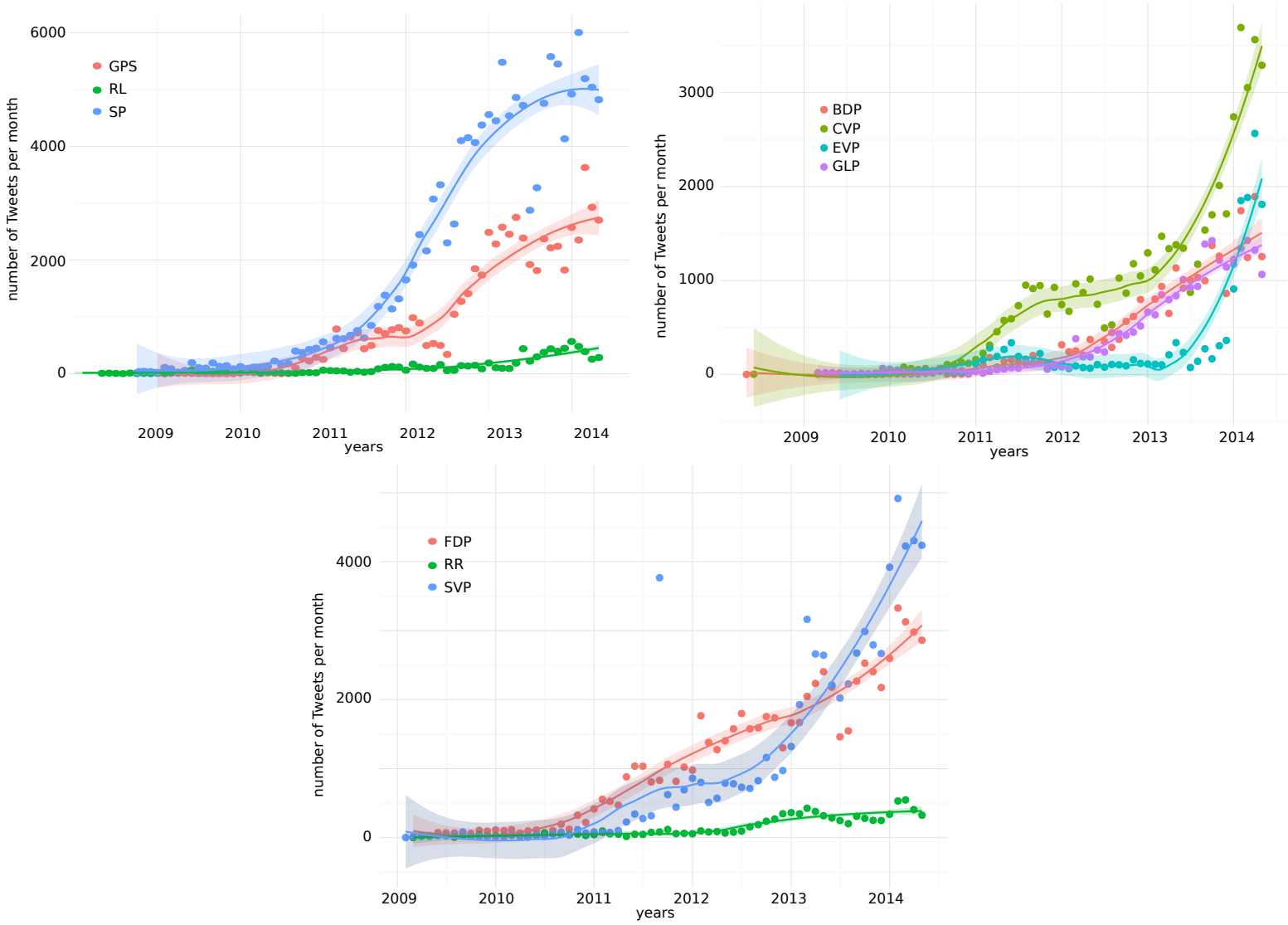
4.3 Content

After having a clearer understanding of the structuration and representativeness of the Swiss party network on Twitter, we now turn to the content of the communication by Swiss parties on Twitter. Twitter allows the unrestricted download of the most recent 3200 Tweets for each user. As a matter of fact, only 3 of the 957 users has sent more than 3200 tweets during the period they had a Twitter account. In other words, the restrictions are so generous that they allow for the collection of almost the entire communication by Swiss parties. Figure 4 provides an overview of the intensity the parties use Twitter. The parties are grouped into the political left, the political center and the political right. Note that the scale of the y-axis is different so that the trends cannot be compared directly.

As we already have seen for the development of the Twitter account set-ups, Twitter was rather a wallflower for political communication purposes in Switzerland until late 2011. While the two major left parties, the Greens and the Social Democrats, already intensely used the microblogging service during the national election campaign in 2011, all other major parties followed only over 2012. It also seems that the Twitter pioneer among the mainstream parties, the SP, has reached the peak of activity in late 2013, since the number of Tweets per month has levelled off at about 5'000 messages. All other major parties are still stepping up their presence on Twitter. Especially the biggest party, the SVP, . It is also remarkable that there is an outlier for almost all parties at the beginning of this year. As the detailed analysis by Blassnig (2014) has shown, the vote on the popular initiative on mass immigration has triggered an intense debate and also increased usual levels of Twitter activity.

In sum, the party affiliated accounts of each of the big four parties (SVP, SP, FDP and CVP) now publish more than 3'000 Tweets per month. For the left, 2011 was the year they embraced microblogging, while the take off for the right parties seems to be in 2013. The following analysis will be concerned with how the parties communicated on Twitter, both in terms of style as well as the issue structuration.

Figure 4: Diachronic development of Tweets by parties: absolute numbers of Tweets per month and loess smoothed trend lines



Second, the communicative style of Twitter users can be considered. Twitter provides its users with rich possibilities to structure conversation, some of which are directly related to the creation of interpersonal relationships and the development of a community feeling (Dann, 2010). Table 7 presents aspects which directly reflect such social interaction by the parties, namely the intensity with which they retweet messages by other users, the frequency of using the @ symbol to indicate a directed message to another Twitter user, and the commonness of replies to messages of other users. All numbers are indicated as ratios relative to the number of Tweets send by the respective party. In other words, the numbers show how often the parties use these social interactive features compared to all Tweets they send. Furthermore, the last column shows a cumulative index of the three indicators. The absolute numbers can be found in Table 12 in the Appendix.

Table 7: Interactivity by party: per Tweet ratios of retweets, @-mentions and replies

	Interactivity per Tweet[a]			
party	retweets	@	replies	cumulative
BDP	0.22	0.96	0.32	1.50
CVP	0.15	0.76	0.29	1.20
EVP	0.25	1.06	0.39	1.69
FDP	0.18	0.75	0.28	1.21
GLP	0.18	1.03	0.26	1.47
GPS	0.21	0.98	0.33	1.53
RL	0.09	0.64	0.29	1.02
RR	0.15	0.42	0.11	0.68
SP	0.20	0.85	0.31	1.35
SVP	0.16	0.78	0.31	1.26

Notes: [a] Columns indicate the ratio between the indicators and all Tweets by a specific party. See Table 12.

Table 7 shows that the two left parties (SP and GPS) as well as the small centrist parties (GLP, BDP and EVP) have a distinctly more conversational communicative style than the other parties. The difference mostly stems from the more frequent use of retweets and @ symbols by these parties. At least for the left parties, it can be speculated that this difference stems from a preference for more deliberation in politics. And the smaller centrist parties may derive their conversational style from their self-perception as consensus-builder apart from the poles of the political spectrum.

5 Conclusion

This contribution put forward a first exploration of the Swiss party Twitter sphere. Starting from a comprehensive sample of Swiss Twitter users which are affiliated to a political party, several aspects of the Swiss 'Tweetocracy' could be

shown. First, a new approach was proposed to identify a comprehensive sample of politically relevant Twitter accounts. Using gecoding and text mining on the self-declared description, screen names and location entries, an initial set of predefined accounts could be extended to a network of most Swiss Twitter users which are affiliated to a political party. It could be shown that the boundaries of the network are probably reached after two extension runs.

The presence by Swiss parties on Twitter is not even rudimentarily representative to the traditional 'offline' political life. Especially in terms of political alignment, but also in terms of socio-structural aspects, political communication is severely biased. More precisely, the political left and the urban centers are substantially overrepresented on this microblogging platform. In turn, this also means that studies on the politics of the political right and/or suburban areas will likely underestimate their findings as long as bias is not not corrected for.

As for the structuration of the Swiss partisan Twitter network, it was found that the Swiss 'tweetocracy' is split into a large crowd of rather passive consumers of twitter messages and a core of highly active users to which party leaders and promising young newcomers belong. Further, there are clear signs of political homophily, since most actors clustered along partisan lines in the network analysis. Only for users with the common language French, the regional origin has some structuring potential beyond partisan politics. Lastly, Alain Berset and Christian Levrat from the Social Democrats could be identified as the most central actors.

The analysis of the content of communication has revealed that for the political left, Twitter is an important medium already from 2011 on. Right parties, in contrast, only started to engage more intensely in microblogging over the course of last year. In terms of style, it could be shown that the two left parties (SP and GPS) as well as the small centrist parties (GLP, BDP and EVP) more intensely engage in social interaction via Twitter. More precisely, these parties use retweets and @ symbols more often.

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Appendix

Table 8: Core set of Swiss political Twitter users

Name	**Twitter screen name**	**Party**	**Political position**
Alain Berset	alain_berset	SPS	Federal Councilor
Martin Landolt	LandoltMartin	BDP	National Councilor
Bernhard Guhl	BernhardGuhl	BDP	National Councilor
Dominique de Buman	DdeBuman	CVP	National Councilor
Stefan Müller	MullerAltermatt	CVP	National Councilor
Alois Gmür	AloisGmuer	CVP	National Councilor
Christian Lohr	Ch_Lohr	CVP	National Councilor
Yannick Buttet	ybuttet	CVP	National Councilor
Elisabeth Schneider	Elisabeth_S_S	CVP	National Councilor
Christophe Darbellay	C_Darbellay	CVP	National Councilor
Luc Barthtassat	BARTHASSAT	CVP	National Councilor
Jacques Neirynck	NeirynckJ	CVP	National Councilor
Kathy Riklin	KathyRiklin	CVP	National Councilor
Viola Amherd	Violapamherd	CVP	National Councilor
Marco Romano	MarcoRomanoPPD	CVP	National Councilor
Barbara Schmid-Federer	SchmidFederer	CVP	National Councilor
Daniel Stolz	d_stolz	FDP	National Councilor
Fathi Derder	fderder	FDP	National Councilor
Andrea Caroni	AndreaCaroniAR	FDP	National Councilor
Markus Hutter	MarkusHutter	FDP	National Councilor
Filippo Leutenegger	F_Leutenegger	FDP	National Councilor
Ruedi Noser	RuediNoser	FDP	National Councilor
Ignazio Cassis	ignaziocassis	FDP	National Councilor
Christa Markwalder	ChristaMarkwald	FDP	National Councilor
Isabelle Moret	IsabelleMoret	FDP	National Councilor
Christian Wasserfallen	cwasi	FDP	National Councilor
Hugues Hiltpold	hhiltpold	FDP	National Councilor
Roland Fischer	RolandFischerNR	GLP	National Councilor
Jürg Grossen	Juerg_Grossen	GLP	National Councilor
Isabelle Chevalley	I_Chevalley	GLP	National Councilor
Beat Flach	beatflach	GLP	National Councilor
Ueli Leuenberger	thegreenpreside	GPS	National Councilor
Aline Trede	alinetrede	GPS	National Councilor
Antonio Hodgers	ahodgers	GPS	National Councilor
Yvonne Gilli	YvonneGilli	GPS	National Councilor
Balthasar Glättli	bglaettli	GPS	National Councilor
Bastien Girod	bastiengirod	GPS	National Councilor
Roberta Pantani	RobiPanta	Lega	National Councilor
Lorenzo Quadri	LorenzQuadri	Lega	National Councilor
Eric Nussbaumer	enussbi	SPS	National Councilor
Marina Carobbio	MarinaCarobbio	SPS	National Councilor
Jacques-André Maire	MaireJack	SPS	National Councilor
Roger Nordmann	NordmannRoger	SPS	National Councilor

(continued on next page)

Core set of Swiss political Twitter users (continued)

Name	Twitter screen name	Party	Political position
Valérie Piller	Valerie_Piller	SPS	National Councilor
Ada Marra	ada_marra	SPS	National Councilor
Cesla Amarelle	CeslaAmarelle	SPS	National Councilor
Manuel Tornare	ManuelTornare	SPS	National Councilor
Mathias Reynard	MathiasReynard	SPS	National Councilor
Susanne Leutenegger Oberholz	SusanneSlo	SPS	National Councilor
Silvia Schenker	SchenkerSilvia	SPS	National Councilor
Matthias Aebischer	M_Aebischer	SPS	National Councilor
Edith Graf-Litscher	EdithGraf	SPS	National Councilor
Jean Christophe Schwaab	jcschwaab	SPS	National Councilor
Yvonne Feri	yferi	SPS	National Councilor
Evi Allemann	eviallemann	SPS	National Councilor
Jacqueline Fehr	jacquelinefehr	SPS	National Councilor
Carlo Sommaruga	CarloSommaruga	SPS	National Councilor
Philipp Hadorn	PhilippHadorn	SPS	National Councilor
Bea Heim	beaheim	SPS	National Councilor
Jacqueline Badran	JayBadran	SPS	National Councilor
Cédric Wermuth	cedricwermuth	SPS	National Councilor
Nadine Masshardt	nmasshardt	SPS	National Councilor
Christoph Mörgeli	ChrMoergeli	SVP	National Councilor
Pierre Rusconi	PierreRusconi	SVP	National Councilor
Luzi Stamm	LuziStamm	SVP	National Councilor
Natalie Rickli	NatalieRickli	SVP	National Councilor
Brunner Toni	SVPBrunner	SVP	National Councilor
Lukas Reimann	lukasreimann	SVP	National Councilor
BDP	BDPSchweiz	BDP	Party Account
CVP	CVP_PDC	CVP	Party Account
EVP	evppev	EVP	Party Account
FDP	FDP_Liberalen	FDP	Party Account
GLP	grunliberale	GLP	Party Account
GPS	GrueneCH	GPS	Party Account
SPS	spschweiz	SPS	Party Account
SVP	SVPch	SVP	Party Account
Filippo Lombardi	lombardi1956	CVP	Counsilor of State
Jean-René Fournier	JR_Fournier	CVP	Counsilor of State
Brigitte Häberli	B_Haeberli	CVP	Counsilor of State
Pirmin Bischof	PirminBischof	CVP	Counsilor of State
Georges Theiler	GTheiler	FDP	Counsilor of State
Felix Gutzwiller	FelixGutzwiller	FDP	Counsilor of State
Paul Rechsteiner	PaulRechsteiner	SPS	Counsilor of State
Didier Berberat	berberatdidier	SPS	Counsilor of State
Pascale Bruderer	PascaleBruderer	SPS	Counsilor of State
Roberto Zanetti	zanettiroberto	SPS	Counsilor of State
Christian Levrat	ChristianLevrat	SPS	Counsilor of State
Liliane Maury Pasquier	votrevoix	SVP	Counsilor of State

Table 9: Keyword gazetteer for the party recognition

Keyword	Label	Language	Keyword	Label	Language
BDP	BDP	de	bourgeoisdémocratique	BDP	fr
bürgerlichdemokratisch	BDP	de	PCS	CSP	fr
CSP	CSP	de	chrétiensocial	CSP	fr
christlichsozial	CSP	de	PDC	CVP	fr
CVP	CVP	de	démocratechrétien	CVP	fr
christlichdemokrat	CVP	de	PEV	EVP	fr
christdemokrat	CVP	de	partievangélique	EVP	fr
EVP	EVP	de	liberauxradicaux	FDP	fr
evangelischevolkspartei	EVP	de	PLR	FDP	fr
FDP	FDP	de	politi	general	fr
freisinn	FDP	de	PVL	GLP	fr
liberalen	FDP	de	vertliberaux	GLP	fr
LPS	FDP	de	partiécologiste	GPS	fr
politi	general	de	verts	GPS	fr
GLP	GLP	de	conseildétat	titles	fr
grünliberal	GLP	de	conseilmunicipal	titles	fr
GPS	GPS	de	conseillermunicipal	titles	fr
grünepartei	GPS	de	conseilnational	titles	fr
grüne	GPS	de	conseillerauxétats	titles	fr
gemeinderat	titles	de	conseildesétats	titles	fr
staatsrat	titles	de	grandconseil	titles	fr
nationalrat	titles	de	conseilexécutif	titles	fr
ständerat	titles	de	lagauche	RL	fr
landamman	titles	de	alliancedegauche	RL	fr
kantonsrat	titles	de	democratssuisses	RR	fr
regierungsrat	titles	de	PSL	RR	fr
landrat	titles	de	suissedelaliberté	RR	fr
standeskommission	titles	de	lega	RR	fr
schultheiss	titles	de	PS	SP	fr
regierungspräsident	titles	de	socialiste	SP	fr
AL	RL	de	JS	SP	fr
alternative	RL	de	PDP	SVP	fr
julia	RL	de	UDC	SVP	fr
PDA	RL	de	uniondémocratique	SVP	fr
parteiderarbeit	RL	de	democraticocristiano	CVP	it
SD	RR	de	PDC	CVP	it
schweizerdemokraten	RR	de	PLR	FDP	it
nationaleaktion	RR	de	liberaliradicali	FDP	it
FPS	RR	de	politi	general	it
freiheitspartei	RR	de	verdiliberali	GLP	it
eidgenössischdemokratisch	RR	de	consigliodistato	titles	it
EDU	RR	de	consigliocomunale	titles	it
Lega	RR	de	consigliodeglistati	titles	it
SP	SP	de	granconsiglio	titles	it
sozialdemokrat	SP	de	lasinistra	RL	it
juso	SP	de	democraticisvizzeri	RR	it
jungsozialist	SP	de	Lega	RR	it
seconda	SP	de	svizzerodellalibert	RR	it
second@	SP	de	PSL	RR	it
SVP	SVP	de	socialista	SP	it
schweizerischevolkspartei	SVP	de	giso	SP	it
solidarit	AL	fr	PS	SP	it
PBD	BDP	fr			

Table 10: Relevant party accounts by extension round

	core	1st extension	2nd extension
SVP	8	110	10
SP	30	220	10
FDP	14	152	8
CVP	18	115	9
GPS	7	74	3
GLP	5	56	2
BDP	3	45	1
RR	2	12	1
EVP	1	22	1
RL	0	13	5
Total	88	819	50

Table 11: Number of followers and accounts as well as cumulative activity index

party	followers	accounts	activity
SVP	47'714	115	168'109
SP	109'930	243	231'458
FDP	57'593	163	113'875
CVP	37'431	131	92'117
GPS	45'916	79	114'220
GLP	15'379	61	41'201
BDP	9'756	44	48'275
RR	6'314	13	11'128
EVP	4'512	22	36'894
RL	4'505	17	28'809

Notes: [a]LSI = Least squares index: $\sqrt{\frac{1}{2}\sum(v_i - s_i)^2}$, where v is the quantity to be compared with (usually vote shares) and s the quantity whose representativeness should be measured (usually parliamentary mandates).

Figure 5: Betweenness centrality, eigenvector centrality and residuals from their correlation in the Twitter network directed by friendships and followings

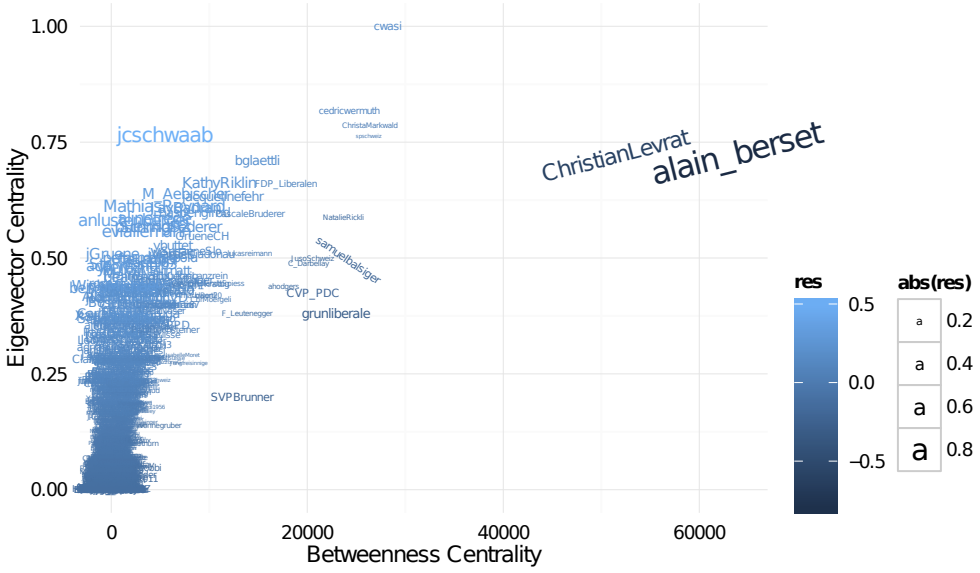
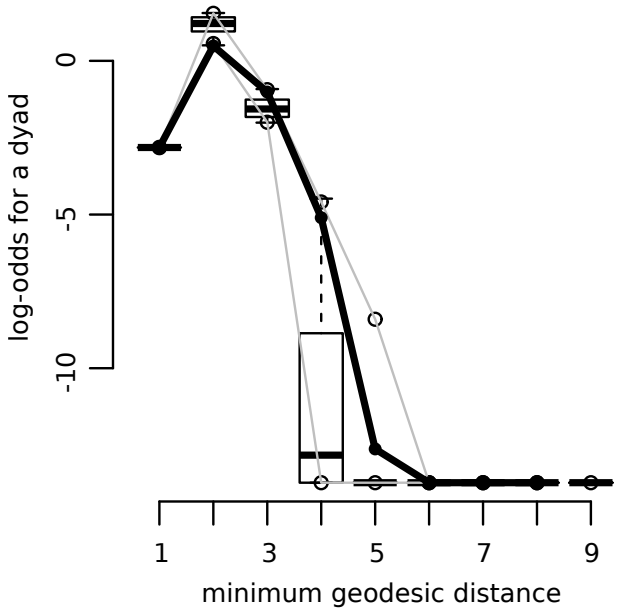


Figure 6: Goddess of fit diagnostic for exponential random graph model presented in Table 6



Notes: Results from simulations (boxplots) compared to actual model fit (bold line).

Table 12: Interactivity by party: absolute numbers of retweets, @-mentions, replies and tweets

party	replies	@	retweets	Tweets
BDP	8'264	24'497	5'744	25'630
CVP	15'199	39'257	7'953	51'855
EVP	5'872	16'034	3'799	15'167
FDP	19'630	51'927	12'373	69'306
GLP	6'032	23'852	4'232	23'224
GPS	20'195	60'613	13'207	61'638
RL	2'391	5'360	732	8'349
RR	929	3'746	1'308	8'832
SP	40'846	111'102	25'703	131'156
SVP	21'251	53'327	11'271	68'324